Adopting Lean Management Principles in Procurement: A Conceptual Model for Improving Cost-Efficiency and Process Flow

JOSEPH OZIGI BASIRU[1], CHINELO LINDA EJIOFOR[2], EKENE CYNTHIA ONUKWULU[3], RITA UCHENNA ATTAH[4]
[1] *S. C. C. Nigeria Limited*
[2] *University of Hertfordshire Hatfield, United Kingdom*
[3] *Kent Business School, University of Kent, UK*
[4] *Independent Researcher, Bloomfield, NJ, USA*

Abstract- ***The adoption of lean management principles in procurement has emerged as a pivotal strategy for enhancing cost-efficiency and optimizing process flow. This conceptual model explores the integration of lean methodologies into procurement practices, focusing on waste reduction, value maximization, and streamlined workflows. Lean management emphasizes continuous improvement, collaboration, and data-driven decision-making, which are critical for addressing inefficiencies in procurement operations. Key components of the model include identifying value-added and non-value-added activities, standardizing processes, and fostering supplier collaboration to enhance overall supply chain efficiency. By employing tools such as value stream mapping, just-in-time (JIT) inventory systems, and Kanban techniques, procurement teams can minimize delays, reduce inventory costs, and improve resource allocation. Furthermore, the model advocates leveraging technology, such as automation and data analytics, to identify bottlenecks and provide actionable insights for process optimization. The proposed framework highlights the importance of aligning lean procurement strategies with organizational goals, ensuring stakeholder buy-in, and promoting a culture of continuous improvement. Challenges, such as resistance to change and the need for initial investment in training and technology, are addressed through targeted interventions and leadership commitment. The model also underscores the role of performance metrics, including lead time, cost savings, and supplier reliability, in assessing the effectiveness of lean procurement initiatives. This conceptual approach not only contributes to achieving cost efficiency but also enhances procurement agility, supplier relationships, and environmental sustainability by minimizing resource wastage. The study provides a foundation for future empirical research and practical implementation of lean principles in diverse procurement contexts.***

Indexed Terms- ***Lean Management, Procurement, Cost-Efficiency, Process Flow, Waste Reduction, Value Stream Mapping, Just-In-Time Inventory, Continuous Improvement, Supplier Collaboration, Automation, Data Analytics, Supply Chain Efficiency.***

I. INTRODUCTION

The application of lean management principles, which focus on eliminating waste and maximizing value, has gained significant traction in various business operations, including procurement. Lean management emphasizes continuous improvement, efficiency, and the reduction of non-value-added activities, making it highly relevant to the procurement function, which often faces challenges in managing costs, supplier relationships, and operational inefficiencies. In procurement, lean principles can drive cost reduction, enhance process flow, and improve supplier collaboration by focusing on streamlining workflows and minimizing delays (Adewusi, Chiekezie & Eyo-Udo, 2022, Pereira & Frazzon, 2021). These principles are particularly important in today's competitive environment, where organizations are under constant pressure to optimize their operations, reduce lead times, and ensure cost-effectiveness.

Despite its potential benefits, traditional procurement practices often involve inefficient processes, high overhead costs, and lengthy cycles, leading to suboptimal outcomes. Inefficiencies such as excess inventory, long approval times, and lack of coordination between procurement and other departments are common issues that impact the effectiveness of procurement operations. The need for a more effective approach to procurement has become evident, highlighting the importance of adopting lean management principles to address these inefficiencies (Okafor, et al., 2023, Okogwu, et al., 2023, Onukwulu, Agho & Eyo-Udo, 2023).

This research aims to develop a conceptual model that applies lean management principles to procurement processes. By doing so, the study will explore how lean tools and techniques can be utilized to improve cost-efficiency and process flow. The objective is to propose strategies that procurement teams can use to reduce waste, optimize workflows, and enhance supplier performance, leading to overall improvements in procurement efficiency. This model will serve as a guide for organizations seeking to implement lean principles and create more agile, cost-effective procurement operations.

The significance of lean procurement is particularly evident in the context of modern supply chains, where organizations are expected to deliver more with less while maintaining high levels of service and quality. The adoption of lean practices in procurement not only supports cost-saving measures but also enables organizations to respond more effectively to market demands, improve supplier relationships, and enhance overall supply chain performance (Akter, et al., 2021, Okpeh & Ochefu, 2010). As such, understanding and implementing lean procurement strategies is crucial for organizations looking to stay competitive in an increasingly complex and globalized business environment.

2.1. Literature Review

Lean management principles, initially developed in the Toyota Production System, focus on creating more value with fewer resources by eliminating waste and enhancing operational efficiency. These principles, which include waste reduction, continuous improvement, and value creation, have since been applied to various sectors, including procurement. In procurement, lean principles aim to optimize processes, reduce costs, and improve overall process flow, helping organizations achieve more with fewer resources while maintaining or improving quality and service (Henke & Jacques Bughin, 2016, Onukwulu, et al., 2021).

The concept of waste reduction is central to lean management. Waste in procurement is typically identified as activities or processes that do not add value to the customer or the organization. These could include unnecessary steps in procurement workflows, excessive stock holding, redundant communication, and delays in approval or payment cycles. By identifying and eliminating such waste, organizations can streamline procurement processes, reduce costs, and improve responsiveness (Abuza, 2017, Ojebode & Onekutu, 2021). Continuous improvement, or kaizen, is another critical aspect of lean management, emphasizing the need for ongoing, incremental improvements to processes and practices. In procurement, this could involve regularly reviewing supplier performance, reassessing sourcing strategies, and improving contract management procedures. Value creation is the ultimate goal of lean management, where organizations focus on enhancing value for customers by optimizing resources and ensuring that every activity in the procurement process contributes to the overall goals (Filatotchev, Ireland & Stahl, 2022, Srivastava, et al., 2022).

Lean tools and techniques are instrumental in applying these principles to procurement processes. One widely used tool is Value Stream Mapping (VSM), which involves visually mapping out the entire procurement process to identify areas of waste, inefficiency, and non-value-added activities. VSM helps procurement teams understand how each step in the process contributes to the overall flow, allowing them to pinpoint bottlenecks and opportunities for improvement (Ebrahim, Battilana & Mair, 2014, Soni & T. Krishnan, 2014). By mapping the entire value stream, organizations can eliminate delays, reduce unnecessary steps, and streamline procurement workflows, leading to faster and more cost-effective procurement cycles. Yaqoobi, 2021, presented

Activities in a Procurement Process as shown in figure 1.

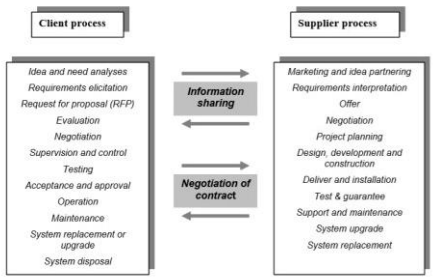

Figure 1: Activities in a Procurement Process (Yaqoobi, 2021).

Another key lean tool used in procurement is the Just-in-Time (JIT) inventory system. JIT aims to reduce inventory levels by ensuring that materials and products are delivered precisely when needed, minimizing storage costs and the risks associated with excess inventory. In procurement, JIT can help organizations improve cash flow by reducing inventory holding costs while ensuring that they can still meet customer demands (Gidiagba, et al., 2023, Ihemereze, et al., 2023, Onukwulu, Agho & Eyo-Udo, 2023). By synchronizing procurement with production schedules and demand forecasts, JIT allows companies to optimize their supply chains, reduce waste, and improve overall procurement efficiency.

Kanban is another lean tool that plays a crucial role in workflow optimization. Originally developed in manufacturing, Kanban is a visual system that helps manage inventory and control production flow. In procurement, Kanban can be used to manage the flow of materials, monitor stock levels, and ensure that the right quantities are ordered at the right time. By using visual signals, such as cards or digital notifications, Kanban enables procurement teams to track inventory levels in real time, preventing stockouts and overstocking while improving efficiency and responsiveness (Diaz, et al., 2021, Singh & Abhinav Parashar, 2021).

Despite the potential benefits of lean management in procurement, several challenges can hinder its successful implementation. One of the most common inefficiencies in procurement is lengthy approval processes. Often, procurement decisions require multiple levels of approval, which can lead to delays and bottlenecks in the process. In many organizations, procurement is also fragmented across different departments or business units, leading to a lack of coordination and inefficiencies (Adewusi, Chiekezie & Eyo-Udo, 2023, Ogbu, et al., 2023, Uwaoma, et al., 2023). This can result in duplicated efforts, unnecessary delays, and missed opportunities for cost savings. Additionally, procurement teams may struggle with managing a large number of suppliers, which can lead to difficulties in maintaining supplier relationships, negotiating favorable terms, and ensuring consistent quality.

Another major challenge in procurement is the rising pressure to reduce costs while maintaining quality and service levels. Procurement teams must balance the need to secure the best prices with the need to build strong relationships with suppliers and ensure timely delivery of goods and services. This can create tension between cost-cutting initiatives and the need for reliability and quality. Moreover, many procurement teams still rely on outdated processes and technologies, which can exacerbate inefficiencies and hinder the adoption of lean practices (Deep, et al., 2022, Silwimba, 2019, Whitehead, 2017).

Technology plays a crucial role in supporting lean procurement by enabling automation, data analytics, and digitalization. Automation can help streamline procurement processes by reducing manual intervention, speeding up approvals, and improving accuracy. For example, automated purchase order systems can reduce the need for paper-based transactions, eliminating delays and errors while ensuring that orders are placed in a timely and accurate manner (Calfa, et al., 2015, Olufemi-Phillips, et al., 2020). Similarly, automated supplier performance management tools can help procurement teams monitor supplier performance in real-time, allowing them to quickly identify and address issues before they become major problems. Figure 2 shows customer-supplier interaction in Procurement in Complex Project in Oil and Gas Industry as presented by Yaqoobi, 2021.

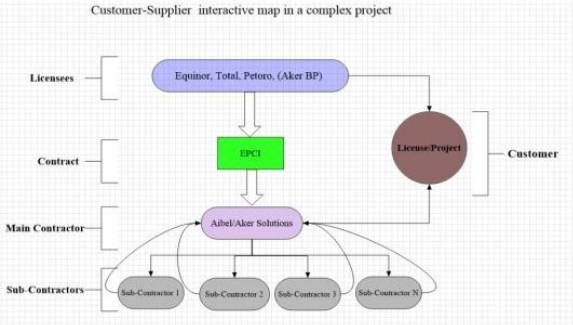

Figure 2: Customer-supplier interaction in Procurement in Complex Project in Oil and Gas Industry (Yaqoobi, 2021).

Data analytics is another powerful tool that can enhance lean procurement. By collecting and analyzing procurement data, organizations can gain valuable insights into spending patterns, supplier performance, and procurement efficiency. This data-driven approach allows procurement teams to make informed decisions, optimize supplier selection, and identify areas for cost reduction and process improvement. For example, advanced analytics can help identify suppliers that consistently deliver late or those that provide lower-quality goods, enabling procurement teams to address these issues proactively (Daraojimba, et al., 2023, Ihemereze, et al., 2023, Tula, et al., 2023).

Digitalization is also transforming procurement by enabling real-time collaboration and communication between procurement teams and suppliers. Cloud-based procurement platforms allow organizations to share information, manage orders, and track deliveries in real time, reducing delays and improving transparency. Digital tools can also provide greater visibility into supply chain risks, allowing procurement teams to identify and mitigate potential disruptions more effectively. With digital platforms, procurement teams can access a broader range of suppliers, negotiate better terms, and improve overall procurement outcomes (Chan, 2020, Sandilya & Varghese, 2016).

In conclusion, adopting lean management principles in procurement has the potential to significantly improve cost-efficiency and process flow by eliminating waste, optimizing workflows, and fostering continuous improvement. Tools such as Value Stream Mapping, Just-in-Time inventory systems, and Kanban offer practical solutions for streamlining procurement processes, reducing costs, and improving supplier relationships. However, challenges such as inefficiencies, delays, and cost drivers must be addressed to ensure the successful implementation of lean practices (Castro, 2019, Salamkar & Allam, 2019). Technology, including automation, data analytics, and digitalization, plays a critical role in supporting lean procurement by enhancing visibility, improving decision-making, and facilitating real-time collaboration. By adopting lean management principles, organizations can transform their procurement operations, reduce costs, and achieve greater efficiency in an increasingly competitive marketplace.

2.2. Conceptual Model Development

The development of a conceptual model for adopting lean management principles in procurement is vital for improving cost-efficiency and streamlining process flow. This model must address key areas such as identifying value-added and non-value-added activities, process standardization, and supplier collaboration strategies, all of which are central to implementing lean management in procurement. By focusing on these areas, organizations can eliminate waste, optimize resources, and improve the overall efficiency of procurement operations (Boda & Immaneni, 2019, Ross & Ross, 2015).

Identifying value-added and non-value-added activities is the first step in developing a lean procurement model. Value-added activities are those that directly contribute to the end value delivered to the customer, such as sourcing quality materials, negotiating favorable terms with suppliers, and ensuring timely delivery. Non-value-added activities, on the other hand, do not contribute to the final product or service and can be classified as waste. These include tasks such as excessive approvals, redundant paperwork, unnecessary inventory holding, and lengthy communication cycles (Ogunjobi, et al., 2023, Onukwulu, Agho & Eyo-Udo, 2023, Uwaoma, et al., 2023). A lean procurement model requires a thorough analysis of the procurement process to identify these activities and eliminate or minimize them. By focusing

only on value-added activities, organizations can reduce waste, shorten cycle times, and increase the overall value provided to customers.

Process standardization is another critical component of the conceptual model. Standardized processes ensure consistency and efficiency in procurement activities, reducing variability and errors. In procurement, standardization could involve creating standardized procedures for selecting suppliers, evaluating bids, issuing purchase orders, and managing contracts. By establishing clear, repeatable processes, organizations can reduce delays, improve compliance, and simplify decision-making (Grandhi, Patwa & Saleem, 2021, Onukwulu, Agho & Eyo-Udo, 2022). Standardization also facilitates the training of staff, ensuring that everyone involved in procurement follows the same guidelines and procedures. This consistency leads to more predictable outcomes and enhances the ability to track and measure performance across procurement functions.

Supplier collaboration strategies are a cornerstone of lean procurement. Strong, collaborative relationships with suppliers allow organizations to achieve mutual benefits, such as cost reductions, improved delivery performance, and enhanced quality. In the context of lean management, procurement teams must work closely with suppliers to ensure that inventory levels are optimized, production schedules are aligned, and potential disruptions are mitigated. By sharing information and collaborating on forecasting, production planning, and delivery schedules, both parties can achieve a more efficient and responsive supply chain (Adewusi, Chiekezie & Eyo-Udo, 2022, Oyeniyi, et al., 2021). Supplier collaboration is also essential for implementing lean tools such as Just-in-Time (JIT) inventory systems and Kanban, as these systems require close coordination between buyers and suppliers to ensure that materials arrive only when needed, reducing inventory costs and improving cash flow. General Procurement Information Flow presented by Yaqoobi, 2021, is shown in figure 3.

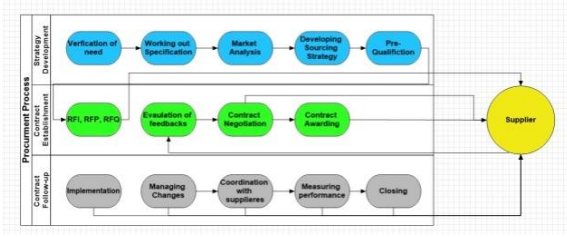

Figure 3: General Procurement Information Flow (Yaqoobi, 2021).

The integration of lean tools into the conceptual model is essential for streamlining procurement processes and improving efficiency. One of the most important tools for lean procurement is Value Stream Mapping (VSM), a technique that helps organizations visualize their procurement processes and identify areas of waste. VSM allows procurement teams to map the flow of materials, information, and resources from the moment a need is identified until the product is delivered to the customer (Okafor, et al., 2023, Onukwulu, Agho & Eyo-Udo, 2023, Uwaoma, et al., 2023). By analyzing the entire value stream, organizations can identify bottlenecks, delays, and other inefficiencies that hinder procurement performance. VSM enables procurement teams to pinpoint areas for improvement, allowing them to eliminate waste, streamline workflows, and optimize the overall process. Through continuous review and refinement of the value stream, procurement teams can drive ongoing improvements and create a more efficient, responsive procurement system.

Just-in-Time (JIT) inventory systems are another crucial lean tool for procurement. JIT focuses on reducing inventory levels by ensuring that materials and products arrive only when needed, thereby minimizing storage costs and the risks associated with overstocking. In the context of procurement, JIT involves close coordination with suppliers to ensure that deliveries are timely and align with production schedules (Arundel, Bloch & Ferguson, 2019, Panda & Sahu, 2014). By adopting JIT principles, procurement teams can optimize inventory levels, reduce waste, and improve cash flow. JIT also enables organizations to be more responsive to market fluctuations and demand changes, as they do not need to carry large inventories to meet customer needs.

Kanban is another key lean tool that can significantly improve procurement efficiency. Kanban is a visual system used to manage inventory and workflow by providing real-time signals to procurement teams about inventory levels and the need for reordering. In a Kanban-based system, procurement teams use visual indicators, such as cards or digital alerts, to track the flow of materials and monitor stock levels. This allows for the efficient management of inventory, ensuring that procurement teams only order materials when necessary and avoid overstocking (Curuksu, 2018, Onukwulu, Agho & Eyo-Udo, 2021, Tseng, et al., 2021). Kanban also improves communication between procurement teams and suppliers, as it provides clear, real-time data on inventory levels and order status. This helps to prevent stockouts, reduce lead times, and enhance the overall flow of materials within the supply chain.

Aligning lean procurement initiatives with organizational goals is a vital aspect of the conceptual model. The success of lean management in procurement is directly tied to its ability to support the broader objectives of the organization. Therefore, it is essential that procurement teams understand the strategic goals of the organization and ensure that their lean initiatives align with these goals. For example, if an organization's strategic goal is to reduce overall operating costs, lean procurement initiatives should focus on identifying and eliminating wasteful activities that contribute to unnecessary costs (Adewusi, Chiekezie & Eyo-Udo, 2023, Onukwulu, Agho & Eyo-Udo, 2023). If the goal is to enhance customer satisfaction, lean procurement initiatives should focus on improving the quality and timeliness of deliveries, ensuring that products are sourced efficiently and meet customer expectations.

Strategic alignment also involves ensuring that lean procurement efforts are supported by senior management and integrated into the organization's overall business strategy. This requires strong leadership, clear communication, and a commitment to continuous improvement across all levels of the organization. By aligning lean initiatives with organizational goals, procurement teams can ensure that their efforts contribute to the long-term success and sustainability of the business (Amirtash, Parchami Jalal & Jelodar, 2021, Pal, Wang & Liang, 2017).

In developing the conceptual model for lean procurement, it is also important to consider the need for ongoing training and development. Employees involved in procurement must be well-versed in lean principles and tools to effectively apply them to their daily tasks. Organizations should invest in training programs to equip procurement teams with the necessary skills and knowledge to implement lean techniques, such as VSM, JIT, and Kanban. Additionally, fostering a culture of continuous improvement is essential for sustaining lean initiatives over time (Adewusi, Chiekezie & Eyo-Udo, 2022, Onukwulu, Agho & Eyo-Udo, 2022). Employees should be encouraged to contribute ideas for process improvements and actively participate in ongoing reviews and refinements of procurement processes.

The integration of technology is another key factor in the successful implementation of lean procurement. Digital tools such as automated procurement systems, data analytics platforms, and cloud-based collaboration tools can enhance the efficiency of lean procurement processes by providing real-time data, improving communication, and streamlining workflows. Technology also enables procurement teams to monitor performance metrics, track supplier performance, and identify areas for further improvement (Al-Hajji & Khan, 2016, Osei-Kyei & Chan, 2015).

In conclusion, the development of a conceptual model for adopting lean management principles in procurement requires a comprehensive approach that incorporates value stream mapping, process standardization, supplier collaboration, and the integration of lean tools such as JIT and Kanban. Aligning lean initiatives with organizational goals ensures that procurement efforts support broader business objectives, while technology and ongoing training play essential roles in sustaining lean improvements (Al Kaabi, 2021, Ordanini, Parasuraman & Rubera, 2014). By focusing on waste reduction, continuous improvement, and value creation, organizations can optimize procurement operations, improve cost-efficiency, and enhance process flow, leading to more efficient and competitive supply chains.

2.3. Methodology

The methodology for developing a conceptual model for adopting lean management principles in procurement is grounded in a qualitative research design. The research aims to provide a comprehensive understanding of how lean principles can be effectively applied to procurement processes to improve cost-efficiency and process flow. A qualitative approach is chosen due to its ability to capture rich, detailed insights from practitioners and real-world case studies, which can help inform the development of the model (Alam, et al.,2019, Nguyen & Hadikusumo, 2018).

The research design focuses on two primary components: the development of the conceptual model and the collection of data through various sources. The model development process begins with a thorough analysis of existing literature on lean management principles, procurement practices, and their application in different industries. This is followed by the examination of case studies from organizations that have successfully adopted lean procurement strategies (Adewusi, Chiekezie & Eyo-Udo, 2023, Onukwulu, Agho & Eyo-Udo, 2023). The case studies will provide practical examples and offer valuable insights into the challenges, benefits, and outcomes of implementing lean management in procurement. These case studies will serve as the foundation for understanding the real-world implications of lean principles and guide the formulation of a conceptual model tailored to procurement practices.

The data collection methods employed in this study include a detailed literature review, interviews with procurement professionals, and surveys on procurement efficiency. The literature review will examine existing research on lean management and procurement, focusing on both theoretical models and practical applications. It will provide a basis for understanding the principles of lean management, such as waste reduction, value stream mapping, and continuous improvement, and how these can be translated into procurement practices (Curuksu, 2018, Onukwulu, Agho & Eyo-Udo, 2021, Tseng, et al., 2021). Additionally, the review will highlight the challenges that organizations face when implementing lean in procurement, such as resistance to change, lack of training, and insufficient supplier collaboration.

Interviews with procurement professionals will be another critical data source. These interviews will provide firsthand insights into the experiences and perspectives of individuals who are directly involved in procurement processes. Procurement professionals will be asked about their understanding of lean management principles, their experiences with adopting lean practices, and the challenges they have encountered. The interviews will also explore how lean principles have impacted procurement performance, including cost-efficiency, process flow, and supplier relationships. By gathering insights from professionals across various industries, the research can identify common trends, challenges, and strategies for successful implementation.

In addition to interviews, surveys will be conducted to assess procurement efficiency. These surveys will target a broader range of procurement professionals and organizations to collect quantitative data on procurement practices, efficiency levels, and the perceived impact of lean initiatives. The surveys will include questions related to key performance indicators such as procurement cycle time, inventory levels, supplier performance, and overall cost savings. By analyzing the survey responses, the study will gain a deeper understanding of how organizations measure procurement efficiency and the role lean management principles play in improving these metrics. The combination of qualitative and quantitative data will provide a well-rounded view of lean procurement practices and their effectiveness.

Data analysis techniques for this study will involve both thematic analysis for qualitative data and comparative analysis of case studies. Thematic analysis will be used to analyze the interview transcripts and survey responses. This technique will help identify common themes, patterns, and insights related to the adoption of lean principles in procurement. The analysis will focus on key areas such as waste reduction, process standardization, supplier collaboration, and the integration of lean tools like Just-in-Time (JIT) and Kanban (Okafor, et al., 2023, Onukwulu, Agho & Eyo-Udo, 2023, Uwaoma,

et al., 2023). By identifying recurring themes across different sources of data, the study will draw conclusions about the most effective strategies for implementing lean procurement.

Comparative analysis will be used to examine the case studies of organizations that have adopted lean procurement. This analysis will compare the procurement processes, outcomes, and challenges faced by different organizations in order to identify best practices and lessons learned. By analyzing a diverse set of case studies, the research will be able to highlight both successful implementations and instances where lean principles were less effective (Kreikamp, 2018, Lisak, et al., 2016). The comparative analysis will also provide insights into the factors that contribute to the success or failure of lean procurement initiatives, such as organizational culture, leadership support, and the level of supplier engagement.

To ensure the validity and reliability of the conceptual model, expert reviews and feedback will be sought at various stages of the research. After the initial development of the conceptual model, experts in the field of lean management, procurement, and supply chain management will be invited to review the model and provide feedback. These experts may include academics, consultants, and professionals with experience in lean procurement. Their feedback will be used to refine and validate the model, ensuring that it is grounded in both theory and practice (Kappagomtula, 2017, Ljubica, Dulčić & Aust, 2016). Experts will also assess the feasibility of the model and its potential to improve cost-efficiency and process flow in procurement processes. The feedback from these experts will be critical for ensuring that the model is both theoretically sound and practically applicable to organizations of different sizes and industries.

Additionally, a pilot implementation of the conceptual model could be conducted with a selected organization or group of organizations to test its applicability in real-world procurement environments. This pilot implementation would involve applying the model to a specific procurement process, collecting data on performance metrics such as cost savings, cycle time, and supplier performance, and analyzing the results. The pilot would provide valuable insights into the practical challenges and benefits of adopting lean principles in procurement, as well as the effectiveness of the conceptual model in improving procurement efficiency (Jackson, 2018, Lücke, Kostova & Roth, 2014). The findings from the pilot implementation would further validate the model and provide concrete evidence of its impact on procurement performance.

In conclusion, the methodology for developing a conceptual model for adopting lean management principles in procurement is designed to provide a comprehensive understanding of how lean practices can improve cost-efficiency and process flow. The research design combines qualitative data from literature, interviews, and case studies with quantitative data from surveys, allowing for a thorough exploration of the challenges and benefits of lean procurement. Data analysis techniques such as thematic analysis and comparative analysis will be used to identify key trends and insights, while expert reviews and pilot testing will ensure the validity and applicability of the model (Hutt & Gopalakrishnan, 2020, Luo & Shenkar, 2017). By following this methodology, the research aims to develop a practical, evidence-based conceptual model that organizations can use to implement lean principles in their procurement processes and achieve significant improvements in efficiency and cost management.

2.4. Implementation Strategies

The implementation of lean management principles in procurement involves strategic actions that address both the operational challenges and the organizational aspects of the process. Successful adoption of lean procurement requires careful planning, effective change management, comprehensive training, the integration of advanced technology, and the establishment of robust performance metrics. By considering these key elements, organizations can create an environment conducive to lean implementation that will improve cost-efficiency, enhance process flow, and foster continuous improvement (Holvino, 2014, Maddux, et al., 2021).

Change management is one of the most crucial factors in the successful adoption of lean management in procurement. Resistance to change is often one of the biggest barriers to implementing new methodologies within organizations, particularly in established processes such as procurement. To overcome this resistance, it is essential to engage stakeholders early in the process. This includes not only procurement teams but also key decision-makers, department heads, and suppliers (Hitt, 2016, Malik, 2018, Shliakhovchuk, 2021). Clear communication about the benefits of lean practices, such as reduced costs, enhanced supplier relationships, and faster procurement cycles, will help in gaining buy-in from all relevant parties. A comprehensive communication plan that explains the changes, addresses potential concerns, and outlines the anticipated benefits is essential. Additionally, fostering a culture of openness and collaboration, where feedback is actively sought and addressed, will help mitigate resistance and ensure that all stakeholders feel included in the transformation process.

Training and development are pivotal to equipping the workforce with the necessary skills and knowledge to successfully implement lean procurement. Lean management principles require a shift in mindset, from focusing solely on cost-cutting to emphasizing value creation, waste reduction, and continuous improvement. Procurement professionals must be trained in specific lean tools and techniques, such as Value Stream Mapping (VSM), Just-in-Time (JIT) inventory systems, and Kanban (Hibbert & Hibbert, 2014, Mirza, 2018, Spring, 2017). Training programs should not only cover the technical aspects of lean practices but also focus on the behavioral and cultural changes that come with adopting lean. Building competencies in lean thinking across the entire procurement team will ensure that individuals are capable of identifying inefficiencies, proposing improvements, and driving change. Furthermore, it is important to provide ongoing support and development opportunities to ensure that employees can continuously enhance their lean skills and stay up to date with new developments in lean procurement.

Leveraging technology plays an instrumental role in the successful implementation of lean management principles in procurement. Advanced technologies, including automation, data analytics, and digital tools, can significantly enhance process optimization. Automation of routine procurement tasks, such as purchase order creation, invoice processing, and supplier communications, can reduce human error, speed up workflows, and eliminate bottlenecks. This will allow procurement teams to focus on higher-value activities, such as supplier collaboration and strategic sourcing (Hajro, Gibson & Pudelko, 2017, Moran & Abramson, 2017). Data analytics tools can provide valuable insights into procurement performance by analyzing historical data, supplier performance, inventory levels, and procurement cycles. With this data, procurement professionals can identify trends, forecast demand more accurately, and make data-driven decisions that align with lean principles. The integration of digital platforms and procurement software will also facilitate the sharing of information between procurement teams, suppliers, and other departments, fostering collaboration and transparency.

Once lean management principles are implemented, it is essential to measure and track the improvements achieved. Performance metrics are vital to understanding how lean procurement practices are affecting key areas such as lead time, cost savings, and supplier reliability. Key Performance Indicators (KPIs) should be carefully selected based on the specific objectives of the lean transformation (Griffith & Dunham, 2014, Moran, Abramson & Moran, 2014). For example, lead time can be tracked to ensure that procurement cycles are being reduced as a result of lean practices. Cost savings are another critical metric, as lean procurement aims to reduce waste and unnecessary expenses. Supplier reliability is another important KPI, as lean procurement emphasizes supplier collaboration and long-term relationships. It is also essential to track the reduction of non-value-added activities and to ensure that procurement processes are becoming more efficient overall. Regular monitoring of these KPIs will help procurement teams assess the success of the lean transformation and identify areas that require further improvement.

Continuous improvement is a fundamental principle of lean management, and it should be embedded in the implementation strategy. Lean procurement is not a one-time initiative but a long-term commitment to

optimizing procurement processes and ensuring they continue to deliver value. As part of the implementation strategy, organizations must establish mechanisms for ongoing feedback and improvement (Gotsis & Grimani, 2016, Nassef & Albasha, 2019). Regular reviews of procurement performance, along with the analysis of KPIs, will allow procurement teams to make necessary adjustments and refine their processes. Moreover, it is important to foster a culture of innovation and continuous learning within the procurement team. This can be done by encouraging employees to propose improvements, share ideas, and participate in problem-solving activities.

Supplier collaboration is also a key component of lean procurement. In many cases, suppliers are critical partners in the procurement process and can have a significant impact on the success of lean initiatives. Building strong, collaborative relationships with suppliers is essential for ensuring that lean practices are implemented effectively across the entire supply chain. This collaboration may involve joint planning sessions, shared forecasting, and real-time data sharing to improve supply chain visibility (French, 2015, Shakerian, Dehnavi & Shateri, 2016). Suppliers can also play a role in identifying opportunities for waste reduction, process improvement, and cost-saving measures. By working together, procurement teams and suppliers can optimize inventory levels, reduce lead times, and enhance the overall efficiency of the supply chain.

The successful implementation of lean procurement requires a holistic approach that encompasses both the internal workings of the procurement department and the relationships with external suppliers. Change management, training, technology integration, and performance measurement are all integral to the successful adoption of lean principles. By addressing these key elements, organizations can streamline their procurement processes, reduce costs, improve supplier relationships, and create a culture of continuous improvement (Cletus, et al., 2018, Rodriguez, 2021). As lean procurement becomes more deeply embedded in the organization's practices, the potential for greater efficiency and value creation expands, leading to long-term success and competitive advantage in the marketplace. Organizations that embrace lean procurement are better positioned to navigate the challenges of modern supply chains, where agility, cost-efficiency, and responsiveness are critical to success.

2.5. Discussion

The adoption of lean management principles in procurement offers numerous benefits that can significantly enhance an organization's efficiency, cost-effectiveness, and overall competitiveness. By focusing on eliminating waste, improving process flow, and fostering continuous improvement, lean procurement aims to streamline operations, optimize resource utilization, and create value for both the organization and its suppliers. These benefits go beyond just cost savings; they extend to improved relationships with suppliers, better responsiveness to market changes, and an overall more agile procurement process (Bouncken, Brem & Kraus, 2016, Shankar, 2021).

One of the most prominent benefits of adopting lean management principles in procurement is the potential for improved cost-efficiency. Traditional procurement processes often involve excess inventory, long lead times, and various forms of waste, which ultimately drive up costs. Lean procurement addresses these inefficiencies by focusing on reducing waste in all forms—whether it's excess inventory, unnecessary administrative tasks, or inefficient workflows (Barclay, 2014, Sucher & Cheung, 2015). By implementing Just-in-Time (JIT) inventory systems, for example, organizations can minimize stock levels, reduce holding costs, and improve cash flow. Moreover, lean procurement emphasizes value creation over cost-cutting, meaning that resources are allocated more effectively to activities that directly contribute to the organization's strategic goals. This not only improves cost-efficiency but also helps in achieving higher-quality outcomes, as lean practices prioritize continuous improvement and operational excellence.

Enhanced process flow is another critical advantage of adopting lean principles in procurement. Traditional procurement practices often involve cumbersome processes with unnecessary steps that delay decision-making and increase lead times. Lean management, on

the other hand, promotes a systematic approach to identifying and eliminating non-value-added activities. Value Stream Mapping (VSM) is one of the key tools used in this context to visually map out procurement processes, identify inefficiencies, and streamline workflows (Anttila, 2015, Steers & Nardon, 2014). By removing bottlenecks and optimizing workflows, procurement teams can respond more quickly to changing market demands, shorten procurement cycles, and improve overall service delivery. This increased agility allows organizations to be more responsive to customer needs and external market changes, making them more competitive in a fast-paced business environment.

Better supplier relationships also emerge as a result of adopting lean management principles. Lean procurement emphasizes collaboration and long-term partnerships with suppliers, rather than simply focusing on short-term cost reductions. By working together to streamline processes, reduce lead times, and improve quality, both the organization and its suppliers benefit from more efficient and effective procurement practices. Lean procurement encourages transparency, information sharing, and joint problem-solving, which fosters trust and mutual understanding between buyers and suppliers (Adnan, Bhatti & Baykal, 2022, Ora, 2016). Stronger supplier relationships not only help in reducing procurement costs but also improve supplier performance, ensure better product quality, and enhance overall supply chain resilience. Furthermore, these partnerships can lead to more innovative solutions as both parties work together to find ways to continuously improve processes and create value.

Despite these significant benefits, the adoption of lean management principles in procurement is not without its challenges and limitations. One of the primary obstacles is the availability of resources. Lean procurement requires investment in tools, technologies, and training to ensure that the team has the necessary skills and expertise to implement lean practices effectively (Kabirifar & Mojtahedi, 2019, Thamrin, 2017). For organizations with limited resources, this initial investment can be a barrier to adoption. Additionally, lean procurement often necessitates a shift in organizational culture, which can be difficult to achieve, particularly in organizations with deeply ingrained traditional procurement practices (Abu-Nimer & Smith, 2016, Pasic, 2020). Employees may be resistant to change, and senior management may be reluctant to commit the necessary resources to implement lean practices. Overcoming this cultural resistance requires a clear communication strategy, strong leadership, and ongoing support for the lean transformation process.

Scalability is another issue that organizations may encounter when implementing lean procurement. While lean principles can be highly effective in smaller procurement operations or for specific procurement processes, scaling them across larger and more complex organizations can be challenging. Larger organizations often have more diverse procurement needs, more complex supply chains, and a greater number of suppliers, all of which can make the standardization of lean practices difficult (Abdallah & Alnamri, 2015, Osland, 2017). Furthermore, as organizations grow, the need for more advanced technology solutions, such as automated procurement systems or sophisticated data analytics platforms, increases. Implementing and scaling such technologies can require significant time, effort, and financial resources, which may be difficult for some organizations to manage (Ibrahim, 2015, Tezel, et al., 2020). Despite these challenges, with the right approach and a commitment to continuous improvement, lean principles can be scaled successfully across larger organizations.

The sustainability implications of adopting lean procurement principles are particularly significant in today's business environment, where organizations are under increasing pressure to reduce their environmental impact and operate more sustainably. Lean procurement helps reduce resource wastage by eliminating inefficiencies and focusing on value-added activities (Hossain, 2018, Syed, et al., 2020, Watson, et al., 2018). For example, by optimizing inventory management and reducing excess stock, organizations can prevent the overproduction and excessive consumption of raw materials, which leads to fewer waste materials and less energy consumption (Moretto, et al., 2022, Vehviläinen, 2019, Vilasini, Neitzert & Rotimi, 2011). In addition, lean procurement practices emphasize the importance of supplier collaboration, which can drive sustainability

efforts across the entire supply chain. By working closely with suppliers to identify opportunities for waste reduction, energy efficiency, and sustainable practices, organizations can contribute to reducing their overall environmental footprint.

Furthermore, lean procurement encourages a culture of continuous improvement, which extends to sustainability goals. As part of the ongoing process of eliminating waste, organizations can continuously seek out ways to reduce their environmental impact and improve the sustainability of their procurement processes. This might involve finding more sustainable sources for raw materials, reducing packaging waste, or using energy-efficient transportation methods for delivering goods (Mohanty, Choppali & Kougianos, 2016, Van Zyl, Mathafena & Ras, 2017). By integrating sustainability into the lean procurement process, organizations can not only improve their bottom line but also contribute to global sustainability goals, making a positive impact on the environment and society.

The role of lean procurement in improving resource efficiency and reducing waste is aligned with broader trends in sustainability, such as the circular economy. By optimizing resource usage and minimizing waste, lean procurement supports the transition to more sustainable business practices. Additionally, lean procurement practices can be integrated with other sustainability initiatives, such as carbon footprint reduction programs or efforts to increase supply chain transparency (Micheli & Cagno, 2016, Toutounchian, et al., 2018). Organizations that successfully adopt lean procurement can position themselves as leaders in sustainability, which can improve their reputation, attract environmentally-conscious customers, and differentiate them in the marketplace.

In conclusion, adopting lean management principles in procurement can offer numerous benefits, including improved cost-efficiency, enhanced process flow, and stronger supplier relationships. However, organizations must also address the challenges associated with resource constraints, cultural resistance, and scalability issues to fully realize the potential of lean procurement (Liu, Wang & Wilkinson, 2016, Thumburu, 2020). Despite these challenges, lean procurement has significant sustainability implications, as it helps reduce resource wastage, optimize inventory management, and promote sustainable practices throughout the supply chain. As organizations continue to face increasing pressure to operate more sustainably, lean procurement provides a powerful tool for achieving both operational excellence and environmental responsibility. By embracing lean management principles, organizations can create a more efficient, effective, and sustainable procurement process that contributes to long-term success and competitive advantage (Frota Barcellos, 2019, Steyn, 2014).

2.6. Conclusion and Recommendations

In conclusion, adopting lean management principles in procurement offers significant potential for improving cost-efficiency and process flow within organizations. Through the conceptual model developed in this study, key insights were gathered regarding the importance of eliminating waste, optimizing workflows, and fostering collaboration with suppliers. The model highlights how lean tools such as Value Stream Mapping (VSM), Just-in-Time (JIT) inventory systems, and Kanban can streamline procurement processes and enhance operational efficiency. By focusing on value-added activities, organizations can reduce inefficiencies, lower costs, and improve service delivery. Moreover, the integration of lean principles into procurement processes contributes to stronger supplier relationships, which further strengthens the overall supply chain.

However, the adoption of lean procurement is not without its challenges. As identified in the discussion, organizational resistance, limited resources, and the scalability of lean practices pose significant barriers to successful implementation. Despite these challenges, the benefits of lean procurement—ranging from cost savings to improved supplier collaboration—underscore its potential as a strategic approach to procurement optimization. Additionally, the sustainability implications of lean procurement, particularly its role in reducing resource waste and promoting environmental responsibility, highlight its alignment with broader sustainability goals. This reinforces the relevance of lean practices not only for

enhancing procurement efficiency but also for contributing to organizational sustainability.

For practitioners, several recommendations are offered to facilitate the successful adoption of lean procurement. First, organizations should prioritize change management by addressing resistance and securing stakeholder buy-in across all levels. Effective leadership, clear communication, and a commitment to continuous improvement are essential to overcoming cultural barriers. Second, training and development initiatives should be implemented to build competencies in lean tools and techniques, ensuring that procurement teams are equipped to drive the lean transformation. Third, leveraging technology is critical to optimizing procurement processes. Automation, data analytics, and digital tools can support lean initiatives by providing real-time insights, improving decision-making, and enhancing process visibility. Finally, organizations should establish performance metrics such as lead time, cost savings, and supplier reliability to track improvements and ensure the sustainability of lean procurement practices.

Future research directions should focus on empirical studies that validate and refine the conceptual model presented in this study. Further research could explore the impact of lean procurement on various types of organizations, particularly in different industries or geographic regions. Comparative studies could investigate how lean procurement practices are adapted and applied in diverse contexts, examining the specific challenges and success factors that influence their implementation. Additionally, future research could explore the integration of lean procurement with other business strategies, such as digital transformation or sustainability initiatives, to enhance overall organizational performance. By expanding the scope of research on lean procurement, scholars can provide deeper insights into its potential to drive continuous improvement and operational excellence across supply chains globally.

REFERENCES

[1] Abdallah, W. M., & Alnamri, M. (2015). Non-financial performance measures and the BSC of multinational companies with multi-cultural environment: An empirical investigation. *Cross Cultural Management*, *22*(4), 594-607.

[2] Abu-Nimer, M., & Smith, R. K. (2016). Interreligious and intercultural education for dialogue, peace and social cohesion. *International Review of Education*, *62*, 393-405.

[3] Abuza, A. E. (2017). An examination of the power of removal of secretaries of private companies in Nigeria. *Journal of Comparative Law in Africa*, *4*(2), 34-76.

[4] Adewusi, A.O., Chiekezie, N.R. & Eyo-Udo, N.L. (2022) Cybersecurity threats in agriculture supply chains: A comprehensive review. World Journal of Advanced Research and Reviews, 15(03), pp 490-500

[5] Adewusi, A.O., Chiekezie, N.R. & Eyo-Udo, N.L. (2022) Securing smart agriculture: Cybersecurity challenges and solutions in IoT-driven farms. World Journal of Advanced Research and Reviews, 15(03), pp 480-489

[6] Adewusi, A.O., Chiekezie, N.R. & Eyo-Udo, N.L. (2022) The role of AI in enhancing cybersecurity for smart farms. World Journal of Advanced Research and Reviews, 15(03), pp 501-512

[7] Adewusi, A.O., Chikezie, N.R. & Eyo-Udo, N.L. (2023) Blockchain technology in agriculture: Enhancing supply chain transparency and traceability. Finance & Accounting Research Journal, 5(12), pp 479-501

[8] Adewusi, A.O., Chikezie, N.R. & Eyo-Udo, N.L. (2023) Cybersecurity in precision agriculture: Protecting data integrity and privacy. International Journal of Applied Research in Social Sciences, 5(10), pp. 693-708

[9] Adnan, N., Bhatti, O. K., & Baykal, E. (2022). A phenomenological investigation on ethical leadership and workplace engagement from a multi-cultural perspective. *International Journal of Organizational Leadership*.

[10] Akter, S., Hossain, M. A., Lu, Q., & Shams, S. R. (2021). Big data-driven strategic orientation

in international marketing. *International Marketing Review*, *38*(5), 927-947.

[11] Al Kaabi, M. S. H. (2021). *Factors Influencing Timely Completion Of Construction Projects In The Oil Industry In The United Arab Emirates-An Exploratory Study* (Doctoral dissertation, Aberystwyth University, UK).

[12] Alam, M., Zou, P. X., Stewart, R. A., Bertone, E., Sahin, O., Buntine, C., & Marshall, C. (2019). Government championed strategies to overcome the barriers to public building energy efficiency retrofit projects. *Sustainable Cities and Society*, *44*, 56-69.

[13] Al-Hajji, H., & Khan, S. (2016, November). Keeping oil & gas EPC major projects under control: strategic & innovative project management practices. In *Abu Dhabi International Petroleum Exhibition and Conference* (p. D021S033R003). SPE.

[14] Amirtash, P., Parchami Jalal, M., & Jelodar, M. B. (2021). Integration of project management services for International Engineering, Procurement and Construction projects. *Built Environment Project and Asset Management*, *11*(2), 330-349.

[15] Anttila, J. (2015). *Multicultural team leadership in an MNC: a middle manager's perspective* (Master's thesis).

[16] Arundel, A., Bloch, C., & Ferguson, B. (2019). Advancing innovation in the public sector: Aligning innovation measurement with policy goals. *Research policy*, *48*(3), 789-798.

[17] Barclay, J. (2014). *Conscious culture: How to build a high performing workplace through values, ethics, and leadership*. Morgan James Publishing.

[18] Boda, V. V. R., & Immaneni, J. (2019). Streamlining FinTech Operations: The Power of SysOps and Smart Automation. *Innovative Computer Sciences Journal*, *5*(1).

[19] Bouncken, R., Brem, A., & Kraus, S. (2016). Multi-cultural teams as sources for creativity and innovation: The role of cultural diversity on team performance. *International Journal of Innovation Management*, *20*(01), 1650012.

[20] Calfa, B. A., Agarwal, A., Bury, S. J., Wassick, J. M., & Grossmann, I. E. (2015). Data-driven simulation and optimization approaches to incorporate production variability in sales and operations planning. *Industrial & engineering chemistry research*, *54*(29), 7261-7272.

[21] Castro, R. (2019). Blended learning in higher education: Trends and capabilities. *Education and Information Technologies*, *24*(4), 2523-2546.

[22] Chan, N. (2020). *Building Information Modelling: An analysis of the methods used to streamline design-to-construction in New Zealand* (Doctoral dissertation, Open Access Te Herenga Waka-Victoria University of Wellington).

[23] Cletus, H. E., Mahmood, N. A., Umar, A., & Ibrahim, A. D. (2018). Prospects and challenges of workplace diversity in modern day organizations: A critical review. *HOLISTICA–Journal of Business and Public Administration*, *9*(2), 35-52.

[24] Curuksu, J. D. (2018). Data driven. *Management for Professionals*.

[25] Daraojimba, C., Eyo-Udo, N. L., Egbokhaebho, B. A., Ofonagoro, K. A., Ogunjobi, O. A., Tula, O. A., & Banso, A. A. (2023). Mapping international research cooperation and intellectual property management in the field of materials science: an exploration of strategies, agreements, and hurdles. *Engineering Science & Technology Journal*, *4*(3), 29-48.

[26] Deep, S., Banerjee, S., Dixit, S., & Vatin, N. I. (2022). Critical factors influencing the performance of highway projects: an empirical evaluation. *Buildings*, *12*(6), 849.

[27] Diaz, A., Schöggl, J. P., Reyes, T., & Baumgartner, R. J. (2021). Sustainable product development in a circular economy: Implications for products, actors, decision-making support and lifecycle information management. *Sustainable Production and Consumption*, *26*, 1031-1045.

[28] Ebrahim, A., Battilana, J., & Mair, J. (2014). The governance of social enterprises: Mission drift and accountability challenges in hybrid

organizations. *Research in organizational behavior*, *34*, 81-100.

[29] Filatotchev, I., Ireland, R. D., & Stahl, G. K. (2022). Contextualizing management research: An open systems perspective. *Journal of Management Studies*, *59*(4), 1036-1056.

[30] French, R. (2015). *Cross-cultural management in work organisations*. Kogan Page Publishers.

[31] Frota Barcellos, J. (2019). Critical Elements of a Successful Project.

[32] Gidiagba, J. O., Daraojimba, C., Ofonagoro, K. A., Eyo-Udo, N. L., Egbokhaebho, B. A., Ogunjobi, O. A., & Banso, A. A. (2023). Economic impacts and innovations in materials science: a holistic exploration of nanotechnology and advanced materials. *Engineering Science & Technology Journal*, *4*(3), 84-100.

[33] Gotsis, G., & Grimani, K. (2016). Diversity as an aspect of effective leadership: Integrating and moving forward. *Leadership & Organization Development Journal*, *37*(2), 241-264.

[34] Grandhi, B., Patwa, N., & Saleem, K. (2021). Data-driven marketing for growth and profitability. *EuroMed Journal of Business*, *16*(4), 381-398.

[35] Griffith, B. A., & Dunham, E. B. (2014). *Working in teams: Moving from high potential to high performance*. Sage Publications.

[36] Habibi, M., Kermanshachi, S., & Rouhanizadeh, B. (2019). Identifying and measuring engineering, procurement, and construction (EPC) key performance indicators and management strategies. *Infrastructures*, *4*(2), 14.

[37] Hajro, A., Gibson, C. B., & Pudelko, M. (2017). Knowledge exchange processes in multicultural teams: Linking organizational diversity climates to teams' effectiveness. *Academy of Management Journal*, *60*(1), 345-372.

[38] Henke, N., & Jacques Bughin, L. (2016). The age of analytics: Competing in a data-driven world.

[39] Hibbert, E., & Hibbert, R. (2014). *Leading multicultural teams*. William Carey Publishing.

[40] Hitt, M. A. (2016). International strategy and institutional environments. *Cross Cultural & Strategic Management*, *23*(2).

[41] Holvino, E. (2014). Developing multicultural organizations. *The NTL Handbook of Organization Development and Change*, 517-534.

[42] Hossain, M. D. (2018). Performance evaluation of procurement system in ICT Industry a case study.

[43] Hutt, C., & Gopalakrishnan, S. (2020). Leadership humility and managing a multicultural workforce. *South Asian Journal of Business Studies*, *9*(2), 251-260.

[44] Ibrahim, I. I. (2015). *Project planning in construction procurement: the case of Nigerian indigenous contractors* (Doctoral dissertation).

[45] Ihemereze, K. C., Ekwezia, A. V., Eyo-Udo, N. L., Ikwue, U., Ufoaro, O. A., Oshioste, E. E., & Daraojimba, C. (2023). Bottle to brand: exploring how effective branding energized star lager beer's performance in a fierce market. *Engineering Science & Technology Journal*, *4*(3), 169-189.

[46] Ihemereze, K. C., Eyo-Udo, N. L., Egbokhaebho, B. A., Daraojimba, C., Ikwue, U., & Nwankwo, E. E. (2023). Impact of monetary incentives on employee performance in the Nigerian automotive sector: a case study. *International Journal of Advanced Economics*, *5*(7), 162-186.

[47] Jackson, J. (2018). Preparing students for the global workplace: The impact of a semester abroad. In *Language and Intercultural Communication in the Workplace* (pp. 88-103). Routledge.

[48] Kabirifar, K., & Mojtahedi, M. (2019). The impact of engineering, procurement and construction (EPC) phases on project performance: a case of large-scale residential construction project. *Buildings*, *9*(1), 15.

[49] Kappagomtula, C. L. (2017). Overcoming challenges in leadership roles–managing large projects with multi or cross culture

teams. *European Business Review*, *29*(5), 572-583.

[50] Kreikamp, R. (2018). *The benefits of applying cultural intelligence concepts to customer satisfaction and team performance* (Doctoral dissertation, Middlesex University).

[51] Lisak, A., Erez, M., Sui, Y., & Lee, C. (2016). The positive role of global leaders in enhancing multicultural team innovation. *Journal of International Business Studies*, *47*, 655-673.

[52] Liu, T., Wang, Y., & Wilkinson, S. (2016). Identifying critical factors affecting the effectiveness and efficiency of tendering processes in Public–Private Partnerships (PPPs): A comparative analysis of Australia and China. *International Journal of project management*, *34*(4), 701-716.

[53] Ljubica, J., Dulčić, Ž., & Aust, I. (2016). Linking individual and organizational cultural competences: One step closer to multicultural organization. *Management: Journal of Contemporary Management Issues*, *21*(Special issue), 51-82.

[54] Lücke, G., Kostova, T., & Roth, K. (2014). Multiculturalism from a cognitive perspective: Patterns and implications. *Journal of international business studies*, *45*, 169-190.

[55] Luo, Y., & Shenkar, O. (2017). The multinational corporation as a multilingual community: Language and organization in a global context. *Language in International Business: Developing a Field*, 59-92.

[56] Maddux, W. W., Lu, J. G., Affinito, S. J., & Galinsky, A. D. (2021). Multicultural experiences: A systematic review and new theoretical framework. *Academy of Management Annals*, *15*(2), 345-376.

[57] Malik, R. S. (2018). Educational challenges in 21st century and sustainable development. *Journal of Sustainable Development Education and Research*, *2*(1), 9-20.

[58] Micheli, G. J., & Cagno, E. (2016). The role of procurement in performance deviation recovery in large EPC projects. *International journal of engineering business management*, *8*, 1847979016675302.

[59] Mirza, M. A. (2018). *Project Management and Leadership Challenges, Volume III: Respecting Diversity, Building Team Meaningfulness, and Growing to Leadership Roles*. Business Expert Press.

[60] Mohanty, S. P., Choppali, U., & Kougianos, E. (2016). Everything you wanted to know about smart cities: The Internet of things is the backbone. *IEEE consumer electronics magazine*, *5*(3), 60-70.

[61] Moran, R. T., & Abramson, N. R. (2017). *Managing cultural differences: Global leadership for the 21st century*. Routledge.

[62] Moran, R. T., Abramson, N. R., & Moran, S. V. (2014). *Managing cultural differences*. Routledge.

[63] Moretto, A., Patrucco, A. S., Walker, H., & Ronchi, S. (2022). Procurement organisation in project-based setting: a multiple case study of engineer-to-order companies. *Production planning & control*, *33*(9-10), 847-862.

[64] Nassef, A., & Albasha, H. (2019, March). Best Leadership Style to Lead Multi-Cultural Teams of Service Companies in the Oil & Gas Industry in the Arabian Gulf. In *SPE Middle East Oil and Gas Show and Conference* (p. D021S011R002). SPE.

[65] Nguyen, H. T., & Hadikusumo, B. H. (2018). Human resource related factors and engineering, procurement, and construction (EPC) project success. *Journal of Financial Management of Property and Construction*, *23*(1), 24-39.

[66] Ogbu, A. D., Eyo-Udo, N. L., Adeyinka, M. A., Ozowe, W., & Ikevuje, A. H. (2023). A conceptual procurement model for sustainability and climate change mitigation in the oil, gas, and energy sectors. *World Journal of Advanced Research and Reviews*, *20*(3), 1935-1952.

[67] Ogunjobi, O. A., Eyo-Udo, N. L., Egbokhaebho, B. A., Daraojimba, C., Ikwue, U., & Banso, A. A. (2023). Analyzing historical trade dynamics and contemporary impacts of emerging materials technologies on international exchange and us

strategy. *Engineering Science & Technology Journal*, *4*(3), 101-119.

[68] Ojebode, A., & Onekutu, P. (2021). Nigerian Mass Media and Cultural Status Inequalities: A Study among Minority Ethnic Groups. *Technium Soc. Sci. J.*, *23*, 732.

[69] Okafor, C. M., Kolade, A., Onunka, T., Daraojimba, C., Eyo-Udo, N. L., Onunka, O., & Omotosho, A. (2023). Mitigating cybersecurity risks in the US healthcare sector. *International Journal of Research and Scientific Innovation (IJRSI)*, *10*(9), 177-193.

[70] Okafor, C., Agho, M., Ekwezia, A., Eyo-Udo, N., & Daraojimba, C. (2023). Utilizing business analytics for cybersecurity: A proposal for protecting business systems against cyber attacks. *Acta Electronica Malaysia*.

[71] Okogwu, C., Agho, M. O., Adeyinka, M. A., Odulaja, B. A., Eyo-Udo, N. L., Daraojimba, C., & Banso, A. A. (2023). Exploring the integration of sustainable materials in supply chain management for environmental impact. *Engineering Science & Technology Journal*, *4*(3), 49-65.

[72] Okpeh, O. O., & Ochefu, Y. A. (2010). The Idoma Ethnic group: A Historical and Cultural Setting. *A Manuscript*.

[73] Olufemi-Phillips, A. Q., Ofodile, O. C., Toromade, A. S., Eyo-Udo, N. L., & Adewale, T. T. (2020). Optimizing FMCG supply chain management with IoT and cloud computing integration. *International Journal of Management & Entrepreneurship Research, 6*(11). Fair East Publishers.

[74] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2021). Framework for sustainable supply chain practices to reduce carbon footprint in energy. Open Access Research Journal of Science and Technology, 1(2), 012–034. https://doi.org/10.53022/oarjst.2021.1.2.0032

[75] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2022). Advances in green logistics integration for sustainability in energy supply chains. World Journal of Advanced Science and Technology, 2(1), 047–068.https://doi.org/10.53346/wjast.2022.2.1.0040

[76] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2022). Circular economy models for sustainable resource management in energy supply chains. World Journal of Advanced Science and Technology, 2(2), 034-057.https://doi.org/10.53346/wjast.2022.2.2.0048

[77] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2023). Decentralized energy supply chain networks using blockchain and IoT. International Journal of Scholarly Research in Multidisciplinary Studies, 2(2), 066 085. https://doi.org/10.56781/ijsrms.2023.2.2.0055

[78] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2023). Developing a Framework for AI-Driven Optimization of Supply Chains in Energy Sector. Global Journal of Advanced Research and Reviews, 1(2), 82-101. https://doi.org/10.58175/gjarr.2023.1.2.0064

[79] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2023). Developing a Framework for Supply Chain Resilience in Renewable Energy Operations. Global Journal of Research in Science and Technology, 1(2), 1-18. https://doi.org/10.58175/gjrst.2023.1.2.0048

[80] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2023). Developing a framework for predictive analytics in mitigating energy supply chain risks. International Journal of Scholarly Research and Reviews, 2(2), 135-155. https://doi.org/10.56781/ijsrr.2023.2.2.0042

[81] Onukwulu, E. C., Agho, M. O., & Eyo-Udo, N. L. (2023). Sustainable Supply Chain Practices to Reduce Carbon Footprint in Oil and Gas. Global Journal of Research in Multidisciplinary Studies, 1(2), 24-43. https://doi.org/10.58175/gjrms.2023.1.2.0044

[82] Onukwulu, N. E. C., Agho, N. M. O., & Eyo-Udo, N. N. L. (2021). Advances in smart warehousing solutions for optimizing energy sector supply chains. Open Access Research Journal of Multidisciplinary Studies, 2(1), 139-157. https://doi.org/10.53022/oarjms.2021.2.1.0045

[83] Ora, E. (2016). Effective leadership and management of a multicultural team: case: Radisson Blu Resort & Spa, Malta Golden Sands.

[84] Ordanini, A., Parasuraman, A., & Rubera, G. (2014). When the recipe is more important than the ingredients: A qualitative comparative analysis (QCA) of service innovation configurations. *Journal of service research*, *17*(2), 134-149.

[85] Osei-Kyei, R., & Chan, A. P. (2015). Review of studies on the Critical Success Factors for Public–Private Partnership (PPP) projects from 1990 to 2013. *International journal of project management*, *33*(6), 1335-1346.

[86] Osland, J. S. (2017). An overview of the global leadership literature. *Global leadership*, 57-116.

[87] Oyeniyi, L. D., Igwe, A. N., Ofodile, O. C., & Paul-Mikki, C. (2021). Optimizing risk management frameworks in banking: Strategies to enhance compliance and profitability amid regulatory challenges.

[88] Pal, R., Wang, P., & Liang, X. (2017). The critical factors in managing relationships in international engineering, procurement, and construction (IEPC) projects of Chinese organizations. *International Journal of Project Management*, *35*(7), 1225-1237.

[89] Panda, D., & Sahu, G. P. (2014). *E-procurement implementation: Comparative study of governments of Andhra Pradesh and Chhattisgarh*. SSRN.

[90] Pasic, A. (2020). Cultural Diversity Impact on the Decision-Making of Leaders within Organizations.

[91] Pereira, M. M., & Frazzon, E. M. (2021). A data-driven approach to adaptive synchronization of demand and supply in omni-channel retail supply chains. *International Journal of Information Management*, *57*, 102165.

[92] Rodriguez, R. (2021). *Employee resource group excellence: Grow high performing ERGs to enhance diversity, equality, belonging, and business impact*. John Wiley & Sons.

[93] Ross, D. F., & Ross, D. F. (2015). Procurement and supplier management. *Distribution planning and control: Managing in the era of supply chain management*, 531-604.

[94] Salamkar, M. A., & Allam, K. (2019). Data Lakes Vs. Data Warehouses: Comparative Analysis on When to Use Each, With Case Studies Illustrating Successful Implementations. *Distributed Learning and Broad Applications in Scientific Research*, *5*.

[95] Sandilya, S. K., & Varghese, K. (2016). A study of delays in procurement of engineered equipment for engineering, procurement and construction (EPC) projects in India: a mixed method research approach.

[96] Shakerian, H., Dehnavi, H. D., & Shateri, F. (2016). A framework for the implementation of knowledge management in supply chain management. *Procedia-Social and Behavioral Sciences*, *230*, 176-183.

[97] Shankar, S. (2021). Leadership Skill in Global and Multi-Cultural Organizations.

[98] Shliakhovchuk, E. (2021). After cultural literacy: New models of intercultural competency for life and work in a VUCA world. *Educational Review*, *73*(2), 229-250.

[99] Silwimba, S. (2019). *An investigation into the effects of procurement methods on project delivery in the Zambian road sector* (Doctoral dissertation, The University of Zambia).

[100] Singh, A. P. A., & Abhinav Parashar, A. (2021). Streamlining Purchase Requisitions and Orders: A Guide to Effective Goods Receipt Management. *J. Emerg. Technol. Innov. Res*, *8*(5), g179-g184.

[101] Soni, P., & T. Krishnan, R. (2014). Frugal innovation: aligning theory, practice, and public policy. *Journal of Indian Business Research*, *6*(1), 29-47.

[102] Spring, J. (2017). *The intersection of cultures: Multicultural education in the United States and the global economy*. Routledge.

[103] Srivastava, A., Jawaid, S., Singh, R., Gehlot, A., Akram, S. V., Priyadarshi, N., & Khan, B. (2022). Imperative role of technology intervention and implementation for

automation in the construction industry. *Advances in Civil Engineering*, *2022*(1), 6716987.

[104] Steers, R. M., & Nardon, L. (2014). *Managing in the global economy*. Routledge.

[105] Steyn, M. (2014). Organisational benefits and implementation challenges of mandatory integrated reporting: Perspectives of senior executives at South African listed companies. *Sustainability Accounting, Management and Policy Journal*, *5*(4), 476-503.

[106] Sucher, W., & Cheung, C. (2015). The relationship between hotel employees' cross-cultural competency and team performance in multi-national hotel companies. *International Journal of Hospitality Management*, *49*, 93-104.

[107] Syed, J., Mahmood, S. K. A., Zulfiqar, A., Sharif, M., Sethi, U. I., Ikram, U., & Afridi, S. K. (2020). The construction sector value chain in Pakistan and the sahiwal coal power project. *China's Belt and Road Initiative in a Global Context: Volume II: The China Pakistan Economic Corridor and its Implications for Business*, 271-287.

[108] Tezel, A., Papadonikolaki, E., Yitmen, I., & Hilletofth, P. (2020). Preparing construction supply chains for blockchain technology: An investigation of its potential and future directions. *Frontiers of Engineering Management*, *7*, 547-563.

[109] Thamrin, D. A. F. (2017). Six Sigma Implementation and Integration within Project Management Framework in Engineering, Procurement, and Construction Projects-A Case Study in a Southeast Asian Engineering, Procurement, and Construction Company.

[110] Thumburu, S. K. R. (2020). Integrating SAP with EDI: Strategies and Insights. *MZ Computing Journal*, *1*(1).

[111] Toutounchian, S., Abbaspour, M., Dana, T., & Abedi, Z. (2018). Design of a safety cost estimation parametric model in oil and gas engineering, procurement and construction contracts. *Safety science*, *106*, 35-46.

[112] Tseng, M. L., Tran, T. P. T., Ha, H. M., Bui, T. D., & Lim, M. K. (2021). Sustainable industrial and operation engineering trends and challenges Toward Industry 4.0: A data driven analysis. *Journal of Industrial and Production Engineering*, *38*(8), 581-598.

[113] Tula, O. A., Daraojimba, C., Eyo-Udo, N. L., Egbokhaebho, B. A., Ofonagoro, K. A., Ogunjobi, O. A., ... & Banso, A. A. (2023). Analyzing global evolution of materials research funding and its influence on innovation landscape: a case study of us investment strategies. *Engineering Science & Technology Journal*, *4*(3), 120-139.

[114] Uwaoma, P. U., Eboigbe, E. O., Eyo-Udo, N. L., Daraojimba, D. O., & Kaggwa, S. (2023). Space commerce and its economic implications for the US: A review: Delving into the commercialization of space, its prospects, challenges, and potential impact on the US economy. *World Journal of Advanced Research and Reviews*, *20*(3), 952-965.

[115] Uwaoma, P. U., Eboigbe, E. O., Eyo-Udo, N. L., Ijiga, A. C., & others. (2023): "Mixed Reality in US Retail: A Review: Analyzing the Immersive Shopping Experiences, Customer Engagement, and Potential Economic Implications." *World Journal of Advanced Research and Reviews*, 2023.

[116] Uwaoma, P. U., Eboigbe, E. O., Eyo-Udo, N. L., Ijiga, A. C., Kaggwa, S., & Daraojimba, D. O. (2023). The fourth industrial revolution and its impact on agricultural economics: preparing for the future in developing countries. *International Journal of Advanced Economics*, *5*(9), 258-270.

[117] Van Zyl, E. S., Mathafena, R. B., & Ras, J. (2017). The development of a talent management framework for the private sector. *SA Journal of Human Resource Management*, *15*(1), 1-19.

[118] Vehviläinen, T. (2019). Improving process efficiency and supply chain management by taking advantage of digitalization-based procurement tools.

[119] Vilasini, N., Neitzert, T. R., & Rotimi, J. O. (2011). Correlation between construction

procurement methods and lean principles. *International journal of construction management*, *11*(4), 65-78.

[120] Watson, R., Wilson, H. N., Smart, P., & Macdonald, E. K. (2018). Harnessing difference: a capability-based framework for stakeholder engagement in environmental innovation. *Journal of Product Innovation Management*, *35*(2), 254-279.

[121] Whitehead, J. (2017). Prioritizing sustainability indicators: Using materiality analysis to guide sustainability assessment and strategy. *Business strategy and the environment*, *26*(3), 399-412.

[122] Yaqoobi, M. M. (2021). *Lean Procurement Design for Complex Projects* (Master's thesis, Stavanger, University of Stavanger).